REMARKS/ARGUMENTS

Addressing Examiners remarks starting with ¶ 1,

1) Claims 1-13 and 16 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

1.1 Please find in the specification:

[0005] [Prior art] .... *As the inlet pressure in channel 520 increases the force required to open cantilever 300 increases; in addition, as the area of channel 400 increases the opening force also increases. Depending upon the actuation mechanism employed in region 130 of FIG. 1 membrane 200 may not expand outward uniformly; the membrane may expand in such a fashion that the cantilever remains unopened or insufficiently open to meet the design criteria.*

[The above is a description of the problem the instant invention solves.]

[0007] *In the present invention, the valve is configured as a normally closed valve with at least two pedestals, one in the position as described in U.S. 5,865,417 and one approximately 1 mm from the original pedestal toward the far cavity wall, as shown in FIG. 3. The advantages of the current invention over the previous embodiment are several. First, the membrane is stiffened and no longer can assume actuated positions which do not*

open the cantilever. Second, more force can now be transferred from the actuation mechanism to open the cantilever; this result further allows the line pressure to be increased to over 100 psig and the inlet ports expanded to at least 1 mm in diameter. Third, by stiffening the membrane and preventing alternate flexure modes of the membrane, greater latitude in placement of the first pedestal is gained. .....

and

[0017] The other function performed by second pedestal 240 is a stiffening of membrane 200 such that it may not flex upward while pedestal 210 stays relatively motionless during the actuation cycle. This situation is known to occur when forces greater than 50 psig are placed on cantilever element 300 over the area of valve seat 410 in the direction of port 400. This condition can be catastrophic when the burst strength of membrane 200 is less than the force required to open the valve and less than the actuation pressure applied internally.

and

[0018] One alternative means to achieve a stiffening of membrane 200 is to form ribs of thicker cross section on the membrane in a direction parallel to first pedestal. ....

and

[0019] An alternative means to achieve a similar result without stiffening the membrane 200 is to form a second pedestal, 245, as shown in FIG. 3B, on cantilever 300. Placing the pedestal on the cantilever simplifies the processing of the membrane while increasing the complexity of the cantilever, a somewhat straightforward task to begin with. Pedestal, 245, hinders the membrane from expanding outward in the region apart from pedestal 210.

Claim 1, as previously amended, reads in the last element:

a means for stiffening positioned on the flexible membrane between the first pedestal and the fluid inlet port such that means for stiffening prevents the flexible membrane from contacting the cantilever.

Claim 6, as previously amended, reads in the last element:

a means for stiffening the flexible membrane; wherein the flexible membrane is attached to the cantilever element through the at least one pedestal; the cantilever element is normally closed over an inlet port; the inlet port is in fluid communication with at least one outlet port; and the means for stiffening is positioned on said flexible membrane between the at least one pedestal and the fluid inlet port such that means for stiffening prevents the flexible membrane from contacting the cantilever.

Claim 16, as previously amended, reads in the last element:

a second pedestal proximate to said first pedestal, wherein said second pedestal is attached to the cantilever element such that the flexible membrane is prevented from substantially flexing in the normally closed condition.

1.2 Please note:

A) The problem as stated in [0005] is the membrane flexing out in such a manner that the cantilever stays in place.

B) A "means for stiffening", clearly called out in the specification as a second pedestal or "ribs", being between the membrane and the cantilever, making it impossible for the membrane to contact the cantilever by a pedestal or rib simply being in contact with the cantilever before the membrane.

C) When the valve actuates, properly, the membrane can not contact the cantilever directly since, by design, a second pedestal or rib is placed between the membrane and the cantilever, similar to the pivot point where a first pedestal is placed between the membrane and the cantilever; this is obvious from the written description and the Figures.

1.3 Applicant respectfully disagrees with Examiner that claims 1, 6 and 16 contain new matter or that inventors were not in possession of the invention. Inventors built and tested successfully several hundred valves constructed as described.

1.4 Subsequent to the telephone conference of October 3 applicant amended the claims as presently submitted to contain language found literally in the specification. Applicant respectfully maintains that one knowledgeable in the art of silicon valve fabrication would interpret the previously amended claims as not containing new matter. However, applicant has amended the claims as requested.

2.0 Addressing Examiners remarks starting with ¶ 2,

Claims 1 to 13 were rejected under 35 U.S.C. S 103(a) as being unpatentable over Harris et al. (U.S. Patent No. 6,149,123) in view of Nestler et al. (U.S. Patent No. 5,040,567).

2.1 MPEP § 2143.01 provides: *"The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. In re Mills, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990)."*

The Federal Circuit has several times expressly addressed the issue of how to evaluate an alleged case of *prima fade* obviousness to determine whether it has been properly made.

Thus, *In re Geiger, supra,* stated, in holding that the PTO "failed to establish *a prima facie* case of obviousness":

Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching, suggestion or incentive supporting the combination. ACS Hospital Systems, Inc. v. Monteffore Hospital, 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984).

There is no suggestion in Harris [123] or Nestler [567] for a combination.

2.2 Analogous art, according to CCPA and Federal Circuit cases, is all art that is either in the field of technology of the claimed invention or deals with the same problem solved by the claimed invention even though outside the field of technology of the invention. Thus, the CCPA held in *In re Wood,* 599 F.2d 1032, 202 USPQ 171 (CCPA 1979):

The determination that a reference is from a nonanalogous art is therefore twofold. First, we decide if the reference is within the field of the inventor's endeavor. If it is not, we proceed to determine whether the reference is reasonably pertinent to the particular problem with which the inventor was involved.

Nestler [567] is clearly "nonanalogous art"; Nestler is not concerned with a silicon MEMS valve nor is the [567] invention solving a problem of a silicon membrane fracturing.

2.3 Independent claims 1 and 6 clearly recite the first pedestal and a means for stiffening which in one embodiment is a second pedestal (210 and 240) illustrated in FIG. 3A. Moreover, the claims further define the structure [of a second pedestal (240)] as being positioned on the flexible membrane (200) between the first pedestal (210) and the fluid inlet port (400), preventing the membrane from touching the cantilever, as is obvious from

the Figures. The Examiner already acknowledges that Harris et al. do not disclose or suggest the second pedestal as defined in claims 1 and 6. Applicant is aware that Harris' [123] discloses all of the other elements of the claim; the valves are almost identical except for a key, novel feature of a second pedestal.

2.4 The Examiner asserts, however, that a second pedestal is disclosed by element 20C in Nestler et al. According to Nestler et al., an actuating member 20 includes "lateral edges 20C bent at right angles" as shown in FIG. 2. Presumably, therefore, the Examiner's purported combination would be to provide similar lateral edges on the flexible membrane (200) disclosed in Harris [123]. Such a combination, however, would lead to lateral edges that project upwardly from the flexible membrane (200) in a direction away from (not toward) the cantilever (300). Therefore, the combination of Harris et al. and Nestler et al. would result in a structure opposite to what is now recited in claims 1 and 6; the combination would be inoperable therefore it can not be considered to be a viable combination. In addition, the proposed combination leads away from the features recited in claims 1 and 6, the present claims clearly are patentable over the cited prior art.

3.0 Claim 16 was rejected under 35 U.S.C. S 103(a) as being unpatentable over Harris (U.S. Patent No, 6,149,123) in view of Johnson et al. (U.S. Patent No. 5,619,177).

3.1 As discussed above, claim 16, as amended, recites the features of a first pedestal (210) and a second pedestal (245), in particular, *wherein said second pedestal is attached to the cantilever element, such that the flexible membrane is prevented from ~~substantially~~ flexing in ~~the normally closed position~~ alternate flexure modes, whereby the flexible membrane can assume only actuated positions that open the cantilever with respect to the inlet port.*

Stated otherwise, according to the present invention and as claimed, the second pedestal is positioned on the non-flexing cantilever (300) and projects toward the flexible member (200).

3.2 The Examiner contends that the sensor 172 shown in FIG. 7 of Johnson et al. could be considered a second pedestal. However, even if we accept the Examiner's somewhat strained assertion that the sensor 172 of Johnson et al. could be interpreted as a "pedestal," there could still be no suggestion from the cited reference to position such a sensor on the non-flexing cantilever (300) disclosed in Harris et al. More specifically, the sensor 172 shown in FIG. 7 of Johnson et al. is provided on a microactuator member 156 that undergoes flexure, in order to detect "up and down bending movement of the distal end of the actuator member" (col. 6, lines 41-42).

3.3 By contrast, in the claimed invention, the second pedestal is disposed on a non-flexing cantilever (300), so as to project from the cantilever (300) toward the flexible membrane (200). Thus, since the cantilever itself does not undergo any kind of flexure, there could be no reason that a person skilled in the art would ever be motivated to provide the sensor 172 of Johnson et al., which specifically is intended to detect bending movements, on the cantilever (300). Moreover, there is absolutely no suggestion in any of the cited references to provide a second pedestal positioned precisely as described in claim 16, namely, wherein the second pedestal (245) is attached to the cantilever element (300) and projects from the cantilever element (300) toward the flexible membrane (200), as clearly shown in Fig. 3B.

4.0 Addressing Examiners remarks starting with ¶ 4,

4.1 A 37 CFR 1.132 Affidavit by Dr. Harris setting forth the facts demonstrating and supporting the "unexpected results" achieved by the present invention is attached.

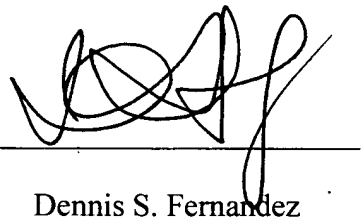
4.2 From [0016] of the specification:

... In the current invention, in one embodiment, additional pedestal, 240, is added to membrane 200 as shown in FIG. 3. Placement of this second pedestal relative to first pedestal is shown in FIG. 5, being about 1 mm in the direction of the inlet port. As can be seen from the scale of FIG. 5, in this embodiment, second pedestal, 240, is somewhat smaller than first pedestal, 210. The dimensions and location of a second pedestal are not critical. What is critical is that the second pedestal be of sufficient height such that upon actuation second pedestal encounters cantilever element 300 early in the actuation cycle and lifts it slightly to start flow through valve port 400.

This description and knowledge of [123] is sufficient to enable one skilled in the art of MEMS and integrated circuit processing to reproduce the instant invention. In addition, no similar structure exists or is suggested in the prior art, even from Harris [123].

Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Respectfully submitted,

By 

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